UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/019,789	01/04/2002	Francois Capman	MTR.0029US	7674

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EXAMINER
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ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/019,789	CAPMAN ET AL.
	Examiner	Art Unit	
	James S. Wozniak	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on <u>04 January 2002</u>.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-54* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,13-25 and 28-54* is/are rejected.

7)☒ Claim(s) *11,12,26 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>04 January 2002</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   **Claims 1 and 16** are objected to because of the following informalities:

- "Frequencies multiple' should be corrected to read --a frequency multiple-- for

    the purpose of grammatical clarity (Claim 1, Lines 8-9 and Claim 16, Line 9).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

$1-16$

3.   **Claims ~~1 and 16~~** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention.

The term " in a neighborhood " in Claim 1, Line 15, and Claim 16, Line 16 is a relative

term which renders the claim indefinite. The term " in a neighborhood " is not defined by the

claim, the specification does not provide a standard for ascertaining the requisite degree, and one

of ordinary skill in the art would not be reasonably apprised of the scope of the invention. "In a

neighborhood" renders the "phase of the spectrum" data indefinite, since it is not defined where

in the frequency spectrum the phase data is obtained. "In a neighborhood' is interpreted to mean

a phase of the spectrum of the audio signal anywhere near a frequency harmonic for the

application of the prior art.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   **Claims 1-2 and 16-17** are rejected under 35 U.S.C. 102(b) as being anticipated by Jain

(U.S. Patent: 5,189,701).

With respect to **Claims 1 and 16,** Jain discloses:

Estimating a fundamental frequency of the audio signal *(Col. 3, Lines 62-68)*;

Determining a spectrum of the audio signal through a transform into the frequency

domain of a frame of the audio signal *(Col. 4, Lines 3-5)*;

Determining a compressed upper envelope of the spectrum of the audio signal

(eliminating high end frequency components, Col. 10, Lines 27-51);

Calculating cepstral coefficients by transforming the compressed upper envelope into a

cepstral domain *(discrete cosine transform applied to reduced high end frequency components,*

Col. 10, Lines 52-68);

Obtaining data representative of spectral amplitudes associated with frequency multiples

of the fundamental frequency from the calculated cepstral coefficients *(Col. 8, Lines 14-25, and*

Col. 11, Line 23- Col. 13, Line 53); and

Including data for coding a harmonic component of the audio signal in a digital output

stream (Col. 4, Lines 3-13 and Col. 8, Lines 14-25), wherein the data for coding the harmonic

component comprise said data representative of spectral amplitudes and, for at least one of the

frequencies multiple of the estimated fundamental frequency, data relating to a phase of the

spectrum of the audio signal in a neighborhood of said multiple frequency *(phase data of*

frequency components that surround the fundamental frequency, Col. 8, Lines 14-25).

With respect to **Claims 2 and 17**, Jain recites:

Interpolating the spectral amplitudes associated with the frequencies multiple of the

fundamental frequency with application of a spectral compression function *(Col. 10, Lines 40-*

51).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

7.   **Claims 3-8, 13-15, 18-23, 28-37, 40-46, and 49-54** are rejected under 35 U.S.C. 103(a)

as being unpatentable over Jain in view of Hermansky et al *(U.S. Patent: 5,450,522)*.

With respect to **Claims 3 and 18**, Jain teaches the speech coding method and system utilizing harmonic data and cepstral coefficients, as applied to Claims 1 and 16. Jain does not specifically suggest transforming the cepstral coefficients by liftering and smoothing in the cepstral domain and calculating minimum phases of an audio signal, however Hermansky discloses a means for performing the aforementioned steps *(Col. 8, Line 49- Col. 9, Line 4)*.

Jain and Hermansky are analogous art because they are from a similar field of endeavor in speech processing utilizing frequency components. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain with a means for transforming the cepstral coefficients by liftering and smoothing in the cepstral domain and calculating minimum phases of an audio signal as taught by Hermansky in order to implement a means for speech signal parameterization that is more robust to with respect to spectral distortions *(Hermansky, Col. 3, Lines 56-58)*.

With respect to **Claims 4 and 19**, Jain teaches the use of harmonic data in encoded speech as applied to Claim 1 and 16, while Hermansky teaches an index weighting of cepstral coefficients *(Col. 8, Line 57- Col. 9, Line 4)*.

With respect to **Claims 5 and 20**, Jain teaches the use of harmonic data for use with a speech encoder as applied to Claim 1 and 16, while Hermansky discloses the liftering process for speech parameterization as applied to Claims 3 and 18.

With respect to **Claims 6 and 21**, Hermansky recites:

Selecting at least one frequency multiple of the fundamental frequency on the basis of a modulus magnitude of the spectrum in absolute value (distance between power spectra for model selection, *Col. 8, Line 49- Col. 9, Line 20, also the examiner takes official notice that it would*

have been obvious to one of ordinary skill in the art, at the time of invention, to utilize an

absolute value of a power spectrum in order to determine the relative distance between power

spectrums in order to select a closest frequency derivative model regardless of whether the

difference is positive or negative).

Wherein the minimized phase discrepancy for the adaptation of the liftering relates to the

at least one selected frequency *(Col. 8, Line 49- Col. 9, Line 20).*

With respect to **Claims 7 and 22,** Hermansky additionally discloses:

Estimating a curve of a spectral masking of the audio signal by means of a

psychoacoustic model *(critical band masking curve, Col. 6, Lines 2-24)*;

Selecting at least one frequency multiple of the fundamental frequency on the basis of a

modulus magnitude of the spectrum in relation to the masking curve *(Col. 8, Line 49- Col. 9,*

Line 20);

Wherein the minimized phase discrepancy for the adaptation of the liftering relates to the

at least one selected frequency *(Col. 8, Line 49- Col. 9, Line 20).*

With respect to **Claims 8 and 23,** Hermansky recites:

Examining variations of the cepstral coefficients *(Col. 8, Line 49- Col. 9, Line 20)*; and

Applying a smoothing of lesser magnitude in the presence of abrupt variations than in the

presence of slow variations of the cepstral coefficients *(fast variations, Col. 6, Lines 50-58, and*

filtering for slowly varying (speech) segments, Col. 8, Line 19- Col. 9, Line 20).

With respect to **Claims 13 and 28,** Jain teaches the use of harmonic data in encoded

speech as applied to Claim 1 and 16, while Hermansky teaches an index weighting of cepstral

coefficients *(Col. 8, Line 57- Col. 9, Line 4).*

With respect to **Claims 14 and 29**, Hermansky additionally discloses:

Representing the quantized phase variation by a slope of the phase of the spectrum at the frequency multiple of the fundamental frequency *(spectral slope measure, Col. 8, Line 57- Col. 9, Line 4)*.

With respect to **Claims 15 and 30**, Hermansky recites:

The quantized phase variation represents a phase model stored in a dictionary determined by learning *(Col. 8, Line 49- Col. 9, Line 4, and neural net, Col. 5, Lines 25-30)*.

Claims 31-37, 40-46, and 49-54 recite a decoder and decoding method that performs the steps of the speech coder and coding method of claims 1-8, 13-23, and 28-30 in reverse order to produce a synthesized output at a receiver. Jain also discloses the inverse variation of encoding steps in a decoding process and system *(Col. 2, Lines 49-53)*. Thus, since Jain and Hermansky teach the all of the required steps for speech encoding as applied to claims 1-8, 13-23, and 28-30, and decoding is an inverse variation of such steps as disclosed by Jain, Claims 31-37, 40-46, 49-51, and 52-54 are rejected for the same reasons.

8.   **Claims 9-10, 24-25, 38-39, and 47-48** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain in view of Hermansky et al, and further in view of Li et al *(U.S. Patent: 5,704,004)*.

With respect to **Claims 9 and 24**, Jain in view of Hermansky teaches the speech coding method and system utilizing varying levels of smoothing based upon fast and slow cepstral variations, as applied to Claims 8 and 23. Jain in view of Hermansky does not specifically suggest the deleting a cepstral coefficient based upon a distance threshold comparison and

subsequent smoothing, however Li teaches a means for performing such a method *(threshold comparison and cepstra averaging, Col. 6, Lines 1-15)*.

Jain, Hermansky and Li are analogous art because they are from a similar field of endeavor in speech processing utilizing frequency components. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Jain in view of Hermansky with the means for deleting a cepstral coefficient based upon a distance threshold comparison and subsequent smoothing as taught by Li to implement more efficient speech signal processing through compression *(Li, Col. 2, Lines 16-21)*.

With respect to **Claims 10 and 25**, Jain in view of Hermansky, and further in view of Li teaches the speech coding method and system utilizing varying levels of smoothing based upon fast and slow cepstral variations and threshold comparison, as applied to Claims 9 and 24. Although Jain in view of Hermansky, and further in view of Li does not specifically suggest the use of an adjustable threshold, the examiner takes official notice that it would have been obvious to one of ordinary skill in the art, at the time of invention, to utilize an adjustable threshold as is well known in the art for processing speech parameters according to a relative and varying noise level in order to implement a more adaptive speech coder.

With respect to **Claims 38-39 and 47-48**, see the above rejection of Claims 31-37, 40-46, 49-54 with reference to the decoding method and decoder, and Claims 9-10 and 24-25 with reference to the subject matter of Claims 38-39 and 47-48.

Allowable Subject Matter

9.   **Claims 11, 12, 26, and 27** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10.   The following is a statement of reasons for the indication of allowable subject matter:

With respect to **Claims 11 and 26**, the prior art of record does not explicitly teach nor specifically suggest the computation for performing the process of transforming cepstral coefficients calculated from a compressed upper frequency envelope by liftering in the cepstral domain as recited in Claims 11 and 26.

Claims 12 and 27 further limit the aforementioned claims, and thus would also contain allowable subject matter.

Conclusion

11.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

McAulay et al *(U.S. Patent: 5,054,072)*- teaches a method for encoding speech waveforms including harmonic data.

Aikawa et al *(U.S. Patent: 5,459,815)*- discloses a speech coding method utilizing a frequency smoothing lifter.

Wang et al *(U.S. Patent: 6,052,658)*- discloses a speech coding device utilizing a

fundamental frequency, harmonic data, and cepstral parameters.

Hardwick *(U.S. Patent: 6,377,916)*- teaches a harmonic vocoder.

12.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632

and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-

Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Wayne Young can be reached at (571) 272-7582. The fax/phone number for the

Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the technology center receptionist whose telephone number is (703) 306-

0377.

W. R. YOUNG
PRIMARY EXAMINER

James S. Wozniak
7/22/2005